MINGO NATIONAL WILDLIFE REFUGE

Puxico, Missouri

ANNUAL NARRATIVE REPORT

Calendar Year 1984

U.S. Department of the Interior
Fish and Wildlife Service
NATIONAL WILDLIFE REFUGE SYSTEM

REVIEW AND APPROVALS

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Puxico, Missouri

ANNUAL NARRATIVE REPORT

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Gerald Clawson — Refuge Manager — 3/8/85 — Date

John W. Ellis — Refuge Supervisor Review — 4/3/85 — Date

Regional Office Approval — Date

INTRODUCTION

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INTRODUCTION

Mingo National Wildlife Refuge is located in portions of Stoddard and Wayne counties in southeast Missouri, approximately 150 miles south of St. Louis. It was established in 1945 under authority of the Migratory Bird Treaty Act as a resting and wintering area for migratory waterfowl. The refuge contains 21,676 acres and lies in a linear basin formed in an ancient abandoned channel of the Mississippi River. The area is predominantly a bottomland hardwood swamp bordered on the west by the foothills of the Ozark Uplift and on the east by a terrace called Crowley's Ridge. Elevations along the top of these ridges range as high as 405' msl compared to the 340' msl elevation of the basin.

Historically, the Mingo Swamp area was a haven for wildlife before logging, drainage, and conversion to agriculture altered the area. Bankruptcy of the Mingo Drainage District in the 1930's set the stage for Federal acquisition and subsequent restoration of the swamp and its productivity. Peak waterfowl populations of 125,000 mallards and 50,000 Canada geese have been recorded.

The refuge contains approximately 15,000 acres of bottomland hardwoods, 1,275 acres of cropland and moist soil units, 700 acres of grasslands, and 5,000 acres of marsh and water. There are seven natural areas on the refuge and 99 identified archaeological sites. In 1976, 7,730 acres were designated as a wilderness area. The Mingo Job Corps Civilian Conservation Center with 224 enrollees is located on the southeast corner of the refuge.

Recreational activities such as fishing; waterfowl, squirrel, turkey and deer hunting; canoeing; and wildlife observation are very popular on the refuge. Annual visitation to the refuge the past five years has averaged over 197,000 visits. Facilities available to the public include a visitor center, a cooperative association sales outlet, a 3/4 mile self-guided boardwalk trail, a 25 mile self-guided auto tour, a photography blind, four observation towers, picnic tables, and a picnic shelter.

A. HIGHLIGHTS

An unusually wet fall produced excellent habitat conditions for waterfowl (Section B).

A fall tornado caused considerable damage near the refuge (Section B).

Progress continued on meeting management planning requirements (Section D.2).

Two new research projects were initiated on the refuge (Section D.5).

Several personnel changes occurred during the year (Section E.1).

The YCC and Job Corps programs were active on the refuge during the year (Section E.2).

The bald eagle cooperative hacking program was successful for the fourth consecutive year (Section G.2).

Two environmental education workshops were held on the refuge (Section H.3).

The Missouri Department of Conservation began construction work on water control structures for Pool 8 (Section I.1).

Several new pieces of equipment arrived during the year (Section I.4).

A cooperative agreement was signed with the University of Missouri for use of refuge facilities (Section J.1).

The annual Project Leaders meeting for RF-2 was held at the refuge in August (Section J.2).

B. CLIMATIC CONDITIONS

Weather information for the vicinity of the refuge was recorded by the Corps of Engineers at Wappapello Lake. This official weather station is located approximately one mile from the southwest corner of the refuge.

Rainfall for the year totaled 54.87 inches, which was ten inches over the normal annual average of 44.74 inches. However, six months actually had below average rainfall, with the last four months of the year providing the majority of the year's precipitation. Monthly average temperatures were below average for eight months of the year. In general, we had a cooler spring and summer; a drier summer; and a much wetter fall than usual.

January was the driest month of the year with 1.07 inches of rain. It was also unusually cold with average temperatures 5.59^{0} below normal. Frozen conditions moved most ducks off the refuge and wildlife out of the swamp to higher ground. Warm temperatures and rain in February caused some minor flooding. A fish kill of several hundred gizzard shad was observed in the Old Mingo River on February 7 following thawing. Snowfall for the year totaled 16 3/4 inches with 2 3/4 inches coming unusually late on March 10 and seven inches unusually early on December 4.

The last spring frost occurred on April 2. Heavy rainstorms in April delayed drainage of Monopoly Lake as scheduled, but surprisingly did not disrupt the spring auto tours. Dry weather from May through August provided excellent working conditions for contract gravel hauling, road repairs, and the State construction project in Pool 8. The dry conditions also permitted the construction of small levees in MSU 2 for a pilot research study. Moist soil plant production would have been questionable without adequate July rainfall. However, millet was head high in portions of Rockhouse by the end of August. Spring temperatures were cool and pleasant this year. Summer average temperatures were also noticably cooler, however, relative humidity remained high. The highest temperature of the year was 99^{0} recorded on June 16. Cool, wet weather came abruptly in early September. The first frost of the fall occurred on November 4.

Rainfall for September through the end of the year totaled 32.3 inches or almost 19 inches over normal. October had 24 days of precipitation. Rainfall filled all the moist soil units and impoundments without any supplemental pumping. Waterfowl habitat conditions were excellent and corresponded perfectly with the late October duck migration. Due to the abundant water conditions, ducks were widely dispersed over the refuge and entire Bootheel area. Archery hunters were limited to higher elevations within the hunting area. Wildlife was forced out of the bottomlands and deer and turkey were heavily concentrated around pasture units. Deer road kills adjacent to the refuge were noticeably up.

The biggest weather story of the year occurred on October 16 when an unusual fall tornado touched down on the refuge and surrounding area. Two houses and a store were completely demolished just north of the refuge. A ½ mile long swath of trees were destroyed in Pool 3 on Duck Creek. Considerable time was spent clearing downed trees from refuge roads and debris from ditches and culverts.

Month	Prec.	Normal Ave.	Snow	Max. Temp.	Min. Temp.	Ave. Temp.	Normal Ave. Temp.
J	1.07"	3.50"	2"	56°F	- 8°F	28.8°F	34.4°F
F	3.32	3.29	5	72	6	40.1	37.9
M	4.06	4.53	2 3/4	70	18	41.7	46.1
A	4.86	4.44	--	88	29	56.5	58.9
M	2.92	4.99	--	90	40	62.6	67.2
J	1.14	3.75	--	99	49	79.7	75.8
J	3.34	3.38	--	98	58	78.3	79.5
A	1.88	3.39	--	96	56	77.6	78.2
S	6.12	3.56	--	97	42	68.4	70.8
O	9.36	2.96	--	90	36	62.1	60.3
N	9.70	3.70	--	78	22	46.3	47.4
D	7.10	3.25	7	70	5	43.7	37.2
	54.87	44.74	16 3/4"				

C. LAND ACQUISITION

1. Fee Title

No further work was done on acquiring boundary round-out tracts identified for the WO several years ago. A local realtor called the refuge a few times when adjoining property was up for sale, but no action was taken. Tracts available would have been beneficial to have, but are not considered critical to any major refuge program or objective.

D. PLANNING

1. Master Plan

No master planning activities were conducted during the year. Mingo was scheduled for master planning back in 1979 while still in Region 6. Since moving to Region 3 in 1980, Mingo has been ranked near the bottom of the backlog of other refuges also needing master planning. In the interim we have proceeded directly with the management planning process.

2. Management Plan

Parts 1 and 2 of the management planning process were completed last year. On May 15-16, Division II Biologist Jerry Cummings visited the refuge to evaluate existing plans and outline the requirements for meeting part 3 of the planning process. The review indicated most of the management subjects of concern were already covered in existing refuge plans.

However updates or revisions were made on the refuge's water management plan, safety plan, crop and grassland management plan, and sign plan. A fishery management plan was written as well as a completely new public use management plan. The hunting plan was amended to permit a historic weapons deer hunt. Most of the plans had been approved by the end of the year.

The need for a forest management plan was identified as a high priority. To assist in this effort, a Division II Forester position was established at the Crab Orchard National Wildlife Refuge and filled in early 1985. The Forester will assist Mingo in conducting basic inventories and developing a management strategy. Since Mingo is responsible for paying all travel and per diem expenses, the amount of work accomplished will depend largely on available funds as well as the needs of other stations in the Division for forestry expertise.

3. Public Participation

No formal public meetings were held during the year. Periodic news releases were issued during the year to keep the public informed on refuge programs and activities.

With the refuge visitor center being open seven days a week for eight and a half months during the year, individuals usually freely express their views to the receptionists on what they like or don't like about the refuge. Corrective action is taken, or an increased emphasis is placed on interpretation if similar complaints are received on a particular subject.

The refuge is heavily visited by a diverse array of organized groups ranging from college field trips to church social youth groups; from Sierra Club outings to bowhunter clubs; and from Audubon birders to high school teachers learning about environmental education. The fact that all these groups find what they are seeking on the same refuge, without conflict or controversy, seems to indicate we are meeting the public's needs.

5. Research and Investigations

Graduate student research is an active program on the refuge due to our close proximity to the Gaylord Memorial Wildlife Laboratory. This facility is jointly financed by the University of Missouri and the Missouri Department of Conservation under the direction of Dr. Leigh Fredrickson. The Laboratory was established in 1956 to train graduate

students and provide a headquarters for study groups conducting field observational studies and research on wildlife management and ecological problems. The facility is located on the Duck Creek Wildlife Management Area which is adjacent to the refuge.

During the year there were three continuing graduate student projects in progress, three studies for which field work has been completed, and two new research projects were initiated.

"The Relationship Between the Wintering Strategies of Mallards and the Dynamics of Lowland Hardwood Wetlands in the Upper Mississippi Delta" (33540-1) Graduate Student - Mickey Heitmeyer

This PhD study was begun in 1981 under the supervision of Dr. Leigh Fredrickson of the University of Missouri. All field work was completed in 1983. Student worked on writing his doctorate dissertation during the year.

"Limnological Investigations of the Mingo-Duck Creek Area" (33540-3) Graduate Student - Glenn D. Wylie

This PhD study was begun in 1981 under the supervision of Dr. John Jones of the University of Missouri. All field work was completed in 1983. Student worked on writing his doctorate dissertation during the year.

"Breeding and Foraging Behavior of Red-Shouldered Hawks in Southeastern Missouri" (33540-4) Graduate Student - Margaret Parker

This study was started in 1982 under the supervision of Professor John Faaborg of the University of Missouri. It was funded by the Forest Service and the Missouri Department of Conservation. All field work was completed in 1983. Student worked on writing her master's thesis during the year.

"The Effects of Flooding on Pin Oaks in Southeastern Missouri" (33540-5) Investigator - Allen Black

This project started out as a post-doctorate study by University of Missouri Professor Allen Black to determine the effects of greentree reservoirs on pin oaks. Professor Black transferred after the study started and field work was picked up by research technicians at the Gaylord Lab. All field work has been completed and a paper is expected to be published on the research.

"The Relationship Between Aquatic Macroinvertebrate Abundance, Litter Decomposition and Nutrient Dynamics in Lowland Hardwood Ecosystems" (33540-6) Graduate Student - Dan Batema

This project was started in 1982 under the direction of Dr. Leigh Fredrickson of the University of Missouri. The following progress report was submitted to the refuge.

This study on bottomland hardwoods is designed to provide important information on habitat quality for waterfowl by attempting to better understand some of the functional processes of these wetlands. Litter decomposition is a major controlling factor in energy and nutrient dynamics, yet little is known of this process in bottomland hardwoods. Decomposition processes, coupled with a dynamic water regime, have important influences on how plants and animals respond in bottomlands. Sixteen plots, representing two forest types (pin oak-sweetgum and overcup oak-red maple) and two flooding regimes (natural flooding and greentree reservoir), have been monitored since October 1982 for nutrient inputs, nutrient exchanges at the forest floor, litter decomposition and aquatic macroinvertebrate abundance.

Nutrient inputs (throughfall, litterfall) to the forest floor have been analyzed for N, P, Ca, Mg, K, and Na. Preliminary results show few differences betwen forest types, but seasonal trends are apparent (low concentrations of nutrients in winter with an increase throughout spring and summer).

Similar analyses of water samples indicate that swamp water is poorly buffered, but differences exist between overcup oak-red maple and pin oak-sweetgum sites (pin oak sites are more acidic).

Leaves of red maple and sweetgum decay more rapidly than either pin oak or overcup oak leaves. Red maple, for example, has about a 50% weight loss in six months while pin oak loses about 15% of its original weight in six months.

Isopods (Ascellus sp.) are by far the most common aquatic invertebrate present in the leaf litter on both forest types and for both flooding regimes. Other dominant invertebrates include chironomids, fingernail clams, oligocheates and amphipods. Spiders and terrestial beetles are common invertebrates just prior to full inundation as well as when water begins to recede from the plots. Data analyses have begun and laboratory analyses continue on invertebrates, litter and soil samples.

"Wintering Ecology of Drake Mallards in the Mingo Basin" (33540-7)
Graduate Student - Dan Combs

This PhD study was begun in 1983 under the supervision of Dr. Leigh Fredrickson of the University of Missouri. The following progress report was submitted to the refuge.

The role of the wintering grounds in maintaining continental mallard populations has received much recent attention. Most studies have focused on hens, and the wintering ecology of male mallards is not well understood. The purpose of this study is to fill some of the deficiencies and to investigate the importance of male mallards in the pairing process. Duck censuses are being conducted to document habitat shifts relative to environmental changes. Activity budget data are being collected in various habitats to compare the behavior of male mallards of different pair status. Paired and unpaired drakes are being collected to examine seasonal changes in food habits, organ weights, and body composition. The second of three field seasons will be completed in March 1985.

Habitat shifts occurred frequently in the first two field seasons and were probably influenced by disturbance primarily in the form of hunting; food availability as influenced by yearly productivity, water levels, and ice cover; physiological needs of the ducks; and weather conditions. The percentage of time that mallards spent in various activities differed according to habitat zone, season, and pair status. Pair and molt status, age, and season collected all influenced organ weights and lipid reserves. Both paired and unpaired drakes fed primarily on moist soil seeds during 1983-84, but there was a greater percentage of invertebrates in the diet of birds collected in the fall of 1984. Future plans are to document these trends with adequate samples and to investigate the relationships between the various factors which influence mallard behavior and body composition.

"Studies on Wetland Propagule Banks with Emphasis on Their Significance in Ecological Management" (33540-8) Graduate Student - Parvaiz Naim

This study was started in June 1983 under the supervision of Dr. Craig Davis of the Botany Department at Iowa State University. The following progress report was submitted.

a) Vegetation Dynamics:

Permanent quadrates were established to record changes in vegetation. It was noted that fluctuations in soil moisture contents accentuated vegetation dynamics, favoring the dominance of less useful species in the area with increasing soil dryness.

A phytosociological survey was conducted to assess the relative abundance of various plant species in the area. It appeared that soil compactness was associated with distinct differences in the quality and quantity of vegetative cover; Polygonum hydropiperoides, Jussea repens, and Eleocharis smallii dominated the vegetation on the western half of the MSU 2S, whereas, the dominants on the eastern half were Eleocharis smallii, Echinochloa crus-galli, and Xanthium strumarium.

b) Seed Bank Characteristics:

Soil cores were extracted from four different locations making a total of eight at each site. The eight cm. diameter soil cores were sliced in one cm. thick cross sections. Five slices from one location were mixed to obtain a composite sample from a given depth. Seeds from such composite samples were separated by wet sieving, identified, checked for apparent viability, and counted.

It was observed that the number of seeds gradually increased in the soil profile down to four cm., and then declined sharply. The distribution of Echinochloa seeds was confined mostly to four-five cm. depth in the soil profile, similar pattern was discernible for the seeds of Panicum.

Leersia seeds were found in greater number at a depth of three-six cm., whereas, those of Bidens were mostly found at two-five cm. depth. The number of Eleocharis seeds increased sharply down to five cm. depth and then declined, whereas, Xanthium seeds decreased in number from top to two cm., below which intact seeds were rare. Polygonum and Diodia seeds were largely present from top to three cm. depth.

The above observations lead to the assumptions that the following control the vegetation in the area:

i) Soil moisture content, and soil compactness; ii) Seed distribution in the soil profile.

Based on these assumptions, an experiment was conducted i) to compare the efficiency of five centimeter discing versus the conventional fifteen centimeter discing on the drawndown surface of the marsh. Since most of the seeds were found in the top four cm. of soil, it was assumed that a five cm. deep discing will be more effective and less costly as compared to the conventional deep discing in bringing the seeds close to the soil surface where they have better chances of germination and subsequent establishment of seedlings, ii) to evaluate the influence of irrigation of drawndown surfaces, on the biomass production, and on seed bank enrichment, and iii) to see the effects of early versus late discing.

In a split-plot layout in MSU 2S, preliminary observations suggested that discing was not a practical task to be performed on the recently drawndown marsh surface. The reason being the instability of the substrate to afford tractor or other heavy machinery. By the time the marsh was dry enough to be disced, the marsh surface was lush green with newly emerged seedlings. Discing under such conditions merely destroyed most of the seedlings. Further, by breaking up the soil surface, discing also accelerated the drying of the soil presumably reducing the chances of germination of the seeds remaining in the top soil. In general, the vegetation responded well when the soil was not allowed to dry below 50% of the Available Water Range. Plots appeared comparatively less green where 75% of the available water was allowed to be depleted before irrigation. The control plots that remained unirrigated throughout the summer appeared to support better growth of Xanthium.

Presently, germination behavior of the dominant species is being studied using a two-way thermal gradient plate to observe the response to various depths of soil at different diurnal temperatures.

Soil samples will be collected during 1985 to examine the effects of various treatments on the enrichment of the seed bank in the area. Seed distribution pattern will be studied in detail and experiments will be conducted to elucidate the mechanisms responsible for the vertical distribution of the seeds in the soil profile.

"Management and Biomass Production of Moist Soil Plants" (33540-9)
Graduate Student - James Kelley Jr.

This is one of two new research studies started during the year under a Cooperative Agreement (No. 14-16-0009-1509) between the Missouri Cooperative Wildlife Research Unit and the University of Missouri. The project is being funded by the Service for $54,755 to "Determine nutrient content, biomass, and food value of moist soil plants used by waterfowl and develop management programs to optimize forage for Swan Lake and Mingo National Wildlife Refuges". The project is under the direction of Dr. Fredrickson. The following progress report was received on Jim's master's program.

Objectives:

1. Identify management conditions which optimize below ground biomass production of nut sedges (Cyperus spp.), blunt spikerush (Eleocharis obtusa) and rice cutgrass (Leersia oryzoides).
2. Quantify seasonal biomass production patterns of these plants.
3. Determine nutritional value of roots, tubers, and browse of plants.

A pilot field season was conducted during summer and fall 1984 on MSU 2. A variety of treatments were performed to determine the effect of discing depth, irrigation, and date of treatment on biomass production. This was accomplished by constructing twelve cells (79 m x 80 m) separated by dikes. Four cells received no irrigation (control), four were irrigated once after discing, and four were irrigated twice during the summer. Each cell had separate areas disced at depths of two and six inches respectively, with other areas receiving no discing (control). Six of the cells were treated at an early date (June 27), and six at a late date (August 5).

Vegetation sampling was conducted from October 6-26. A total of fifteen quadrats (0.25 m^2) were sampled in each treatment combination to determine species composition and stem density. Sub-quadrats were excavated for below ground biomass. Late-treated areas contained substantially less biomass and were not sampled. Time restrictions prevented single irrigation areas from being sampled. Data analyses has not been conducted, however preliminary observations are presented below.

Spikerush Non-irrigated, non-disced areas appeared to have the greatest above ground biomass density of spikerush (12.0 g/m^2 dry weight). Irrigation with no discing produced the greatest below ground biomass density (2.0 g/m^2).

Nut sedges, annuals Irrigated areas had greater stem counts of annual Cyperus species, with six inch, two inch, and no disc densities of 530.9, 31.2, and 17.6 stems/m^2, respectively. Non-irrigated areas had only 54.1, 23.5, and 0 stems/m^2 for the six inch, two inch, and no disc areas, respectively.

Biomass patterns of annual Cyperus species followed a similar pattern. Irrigated, six inch disced areas had the highest above and below ground biomass densities, with 133.4 and 14.0 g/m^2 (dry weight), respectively. Non-irrigated, six inch disced areas produced only 5.6 and 1.0 g/m^2 for above and below ground biomass, respectively.

Nut sedges, perennial Chufa (Cyperus esculentus) is a tuber producing perennial commonly found in moist soil units. Irrigated areas with two inch discing produced the greatest density of chufa stems (64.5 stems/m^2), above ground biomass (30.2 g/m^2), and tubers (29.4 g/m^2). Six inch discing appeared to be detrimental to chufa growth, producing only 3.5 stems/m^2 in irrigated areas.

In 1985, the treatment which optimized tuber production in the pilot study will be implemented on larger areas. Biomass production on these large areas will be quantified to determine availability of biomass to waterfowl.

"The Utilization of Rootstocks and Browse by Waterfowl on Moist Soil Impoundments" (33540-10) Graduate Student - Donald McKenzie

This is the second new study funded under the Cooperative Agreement. The objectives and study methods are listed below.

Objectives:

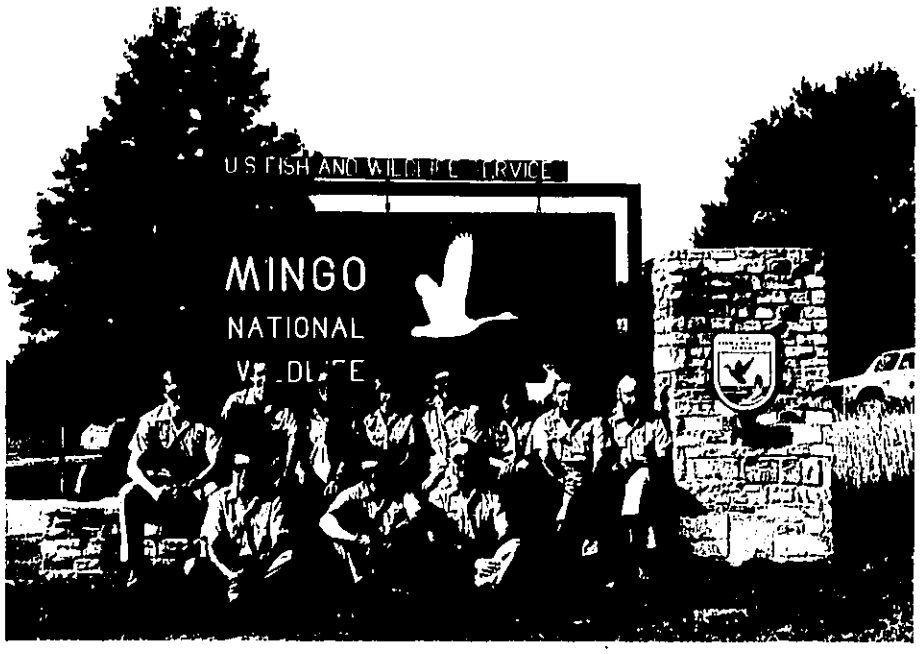
1. Document the utilization of rootstocks and browse by mallards and Canada geese on manipulated moist soil impoundments.
2. Identify any differences in utilization of rootstocks and browse based on species, subspecies (of Canada geese), sex, pair and breeding status, physiological condition, season, weather and availability.
3. Develop management strategies to enhance production of rootstocks and browse and maximize their subsequent availability to and utilization by waterfowl.

Methods:

1. Censuses, conducted weekly to monitor waterfowl numbers on treatment versus control impoundments through the season;
2. Time Activity Budgets
   - A. Scan sampling on all impoundments to determine:
     1. Dominant activities of waterfowl using treatment and control impoundments;
     2. Percent of birds possibly eating rootstocks or browse, by species, subspecies and sex.
   - B. Focal bird sampling on treatment impoundments to determine:
     1. Activities of paired versus unpaired mallards;
     2. Activities of geese of different subspecies.
3. Collections of birds apparently consuming rootstocks or browse (20 mallards and 20 geese/month) to:
   - A. Verify consumption of rootstocks or browse;
   - B. Determine sex and subspecies (in geese) and body condition.

E. ADMINISTRATION

1. Personnel



3 2 4 7 11 6 10 9
8 1 12

1.	Gerald L. Clawson	Refuge Manager	GS-12 EOD 1971 PFT
2.	Eric Sipco	Assistant Manager	GS-11 EOD 1977 PFT
3.	Thomas G. Bell	Outdoor Recreation Planner	GS-9 EOD 1977 PFT Transferred 8/31/84
4.	Debra L. Kimbrell	Refuge Manager (Trainee)	GS-5 EOD 1/84 PFT
5.	Jerry D. Kuykendall	Assistant Manager	GS-9 EOD 9/84 PFT
6.	Judy L. McClendon	Secretary	GS-5 EOD 1977 PFT
7.	Brenda L. Foster	Information Receptionist	GS-2 EOD 1982 PFT
8.	Audrey Walk	Maintenance Leader	WL-8 Retired 1/3/84
9.	Richard L. Sebree	Engineering Equipment Operator	WG-8 EOD 1969 PFT
10.	Howard G. Shelton	Maintenance Worker	WG-8 EOD 1965 PFT
11.	Douglas J. Siler	Maintenance Worker	WG-6 EOD 1977 PFT
12.	Charles A. Walk	Tractor Operator	WG-7 EOD 1962 CSFT
13.	Thomas W. McGowen	Custodial Worker	WG-2 EOD 1977 PI
14.	Teresa F. Cookson	Information Receptionist	GS-1 4/14/84-11/25/84

Personnel changes during the year were as follows:

Debra Kimbrell - GS-485-5 - EOD 1/8 as refuge manager trainee. Debra was formerly a coop education student with work experience at Salton Sea, San Luis, and San Francisco Bay National Wildlife Refuges.

Teresa Cookson - GS-304-1 - EOD 4/14 as information receptionist at the visitor center. Teresa worked weekends and holidays through November on a temporary stay-in-school appointment.

Thomas Bell - GS-023-9 (ORP) transferred to Squaw Creek National Wildlife Refuge as assistant refuge manager effective COB 8/31.

Jerry Kuykendall - GS-485-9 assistant refuge manager EOD 9/16. Jerry was reinstated following a fifteen month absence from the Service. He previously worked as assistant refuge manager at Aransas and Swan Lake National Wildlife Refuges.

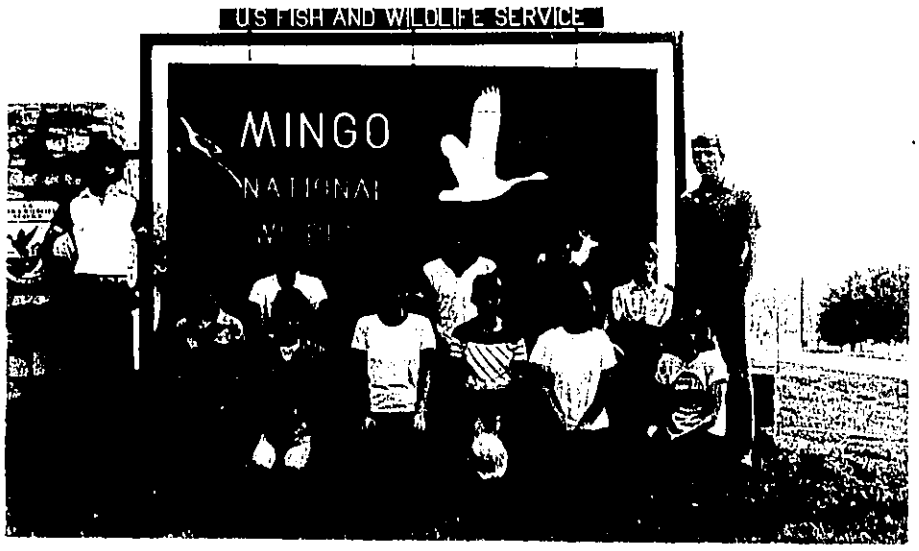
Custodial Worker Thomas W. McGowen DK

Information Receptionist Teresa Cookson DK

The following table compares on board strength for the past five years.

Year	PFT	PPT or Seasonal	Temporary
1984	9	2	1
1983	9	2	1
1982	7	3	4
1981	6	3	3
1980	6	3	4

2. Youth Programs



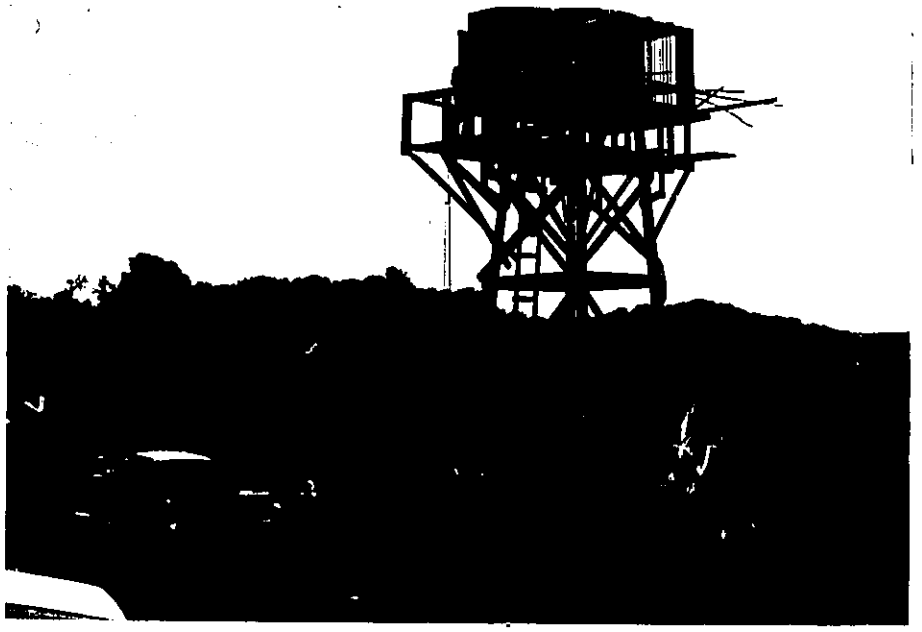
1 3 4 5 6 7 8 2
9 10 11 12 13 14

1.	Stephen Cookson	Crew Leader
2.	Larry Payton	Crew Leader
3.	James Overby	Enrollee
4.	Michael Evans	Enrollee
5.	Timothy Strickland	Enrollee
6.	Kenneth Cook	Enrollee
7.	Jeffrey Harty	Enrollee
8.	Lloyd Parker	Enrollee
9.	Ramona Berrong	Enrollee
10.	Carmen Biggerstaff	Enrollee
11.	Tammy Henson	Enrollee
12.	April Hull	Enrollee
13.	Lana Foster	Enrollee
14.	Missy Cookson	Enrollee

The Youth Conservation Corps (YCC) program increased to twelve enrollees.

The crew leaders, Larry Payton and Stephen Cookson, were the same as last year. Both are teachers in Puxico and were provided under contract with the school system at a cost of $102/day. Transportation was in the form of a twelve passenger van leased from the East Missouri Action Agency Headstart program at Farmington along with the refuge crew cab pickup.

The YCC program went smoothly with no major incidents. Major work projects included boundary fence replacement in GU-18 (Elledge pasture) and the shop clover field, lawn mowing, road and trail maintenance, construction of a second eagle cage on the hacking tower, and construction of four new bulletin boards at hunter entrance points along Pool 8. Payroll problems associated with conversion to the new payroll system were a major headache, but apparently were all ironed out by the end of the calendar year.



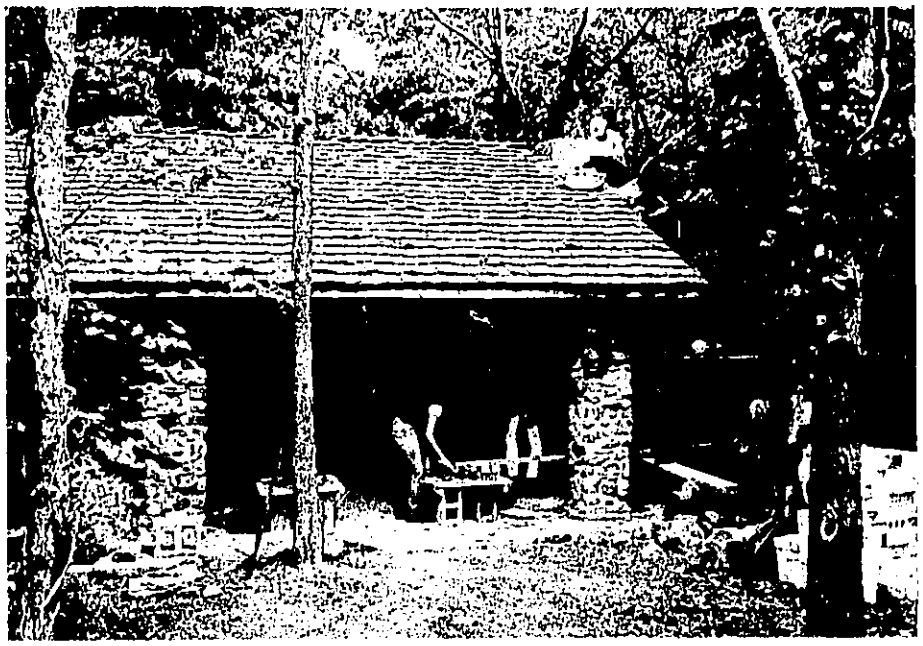
YCC crew assisting with construction of a second cage on the eagle hacking tower. DK

The Job Corps program survived another year with no major changes or cutbacks. Although the Union heavy equipment program appeared in jeopardy a year ago, it continued to operate. As the year ended, rumors were again abundant about the future of the entire Job Corps program. Rumors of closure appear to flourish in four-year cycles.

Job Corps completed several refuge projects including restaining the exterior of the visitor center, installing a new roof on the 8-stall equipment building, constructing a native stone fireplace in the visitor center picnic shelter, and installing a floor hoist in the maintenance shop. On center projects included an addition to the welding shop, excavation for a new dormitory north of the gymnasium, addition of a classroom in the messhall for cook trainees, and numerous other smaller rehabilitation and remodeling projects. Off center projects included heavy equipment work at Three Rivers College in Poplar Bluff, road construction in Wayne County, and a ball diamond for the city of Greenville.

YCC crew working on new bulletin board at a Pool 8 hunter entrance. TB

Maintenanceman Siler roofing Pool 8 bulletin board TB



Job Corps crew working on stone fireplace at the refuge picnic shelter.

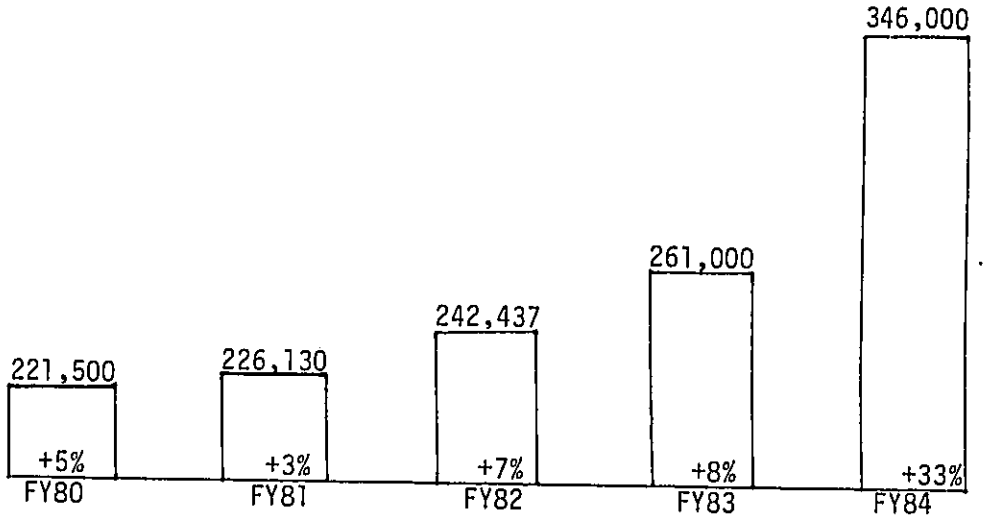
4. Volunteer Programs

The Scenic Rivers Audubon Club provided two volunteers to work each of the two Sundays of the spring auto tour. The volunteers were stationed at Fry Bluff and the Monopoly Lake overlook with spotting scopes to aid visitors viewing wildlife and wildflowers.

Jim Moroni, local photographer, volunteered his services on several occasions when refuge photographs were needed.

5. Funding

Refuge funding for operation and maintenance was adequate. Funding for the past five years is shown as follows:



Fiscal year 1984 funding shown above included $74,000 ARMM's money. An additional $25,000 was available for construction of a water control structure on Stanley Creek but lost when no bids were received at the end of the fiscal year. Additional special funding available over the past five years was as follows:

FY80 - $127,000 (BLHP) moist soil rehab and equipment purchases
FY81 - $144,000 (BLHP) equipment purchases
FY82 - $ 26,500 EOY gravel and equipment purchases plus $7,000 YCC
FY83 - $ 17,700 YCC
FY84 - $ 18,990 YCC

6. Safety

Monthly safety meetings were held with topic assignments rotated among employees. Safety films made available through the Regional Safety Office were shown as follows:

January	- Slides - Adverse Driving Conditions
February	- I am Joe's Spine
March	- Safety Everywhere, All the Time
April	- Option to Live
May	- Down and Out
June	- We'll See Tomorrow
July	- Heatwave and Safety Check Your Car
August	- New Breath of Life
September	- Big Blind Spot
October	- Pro Driving: A Question of Attitudes
November	- Tire Hydroplaning
December	- Preventable or Not

Support from the Regional Safety Office in the form of materials for safety meetings continued to be excellent. A general health and safety inspection of the station was completed on May 16 by Howard Shelton. No major health or safety problems were identified. The station safety committee consisted of Clawson, McClendon, and Siler.

Two reportable accidents occurred during the period as follows:

October 12 - Sprained muscle while lifting - Howard Shelton
December 17 - Minor property damage, left front fender on Chevrolet Luv pickup - Eric Sipco

No reportable YCC accidents occurred during the year. The station safety record of calendar days without a lost time accident stands at 1,825 at the end of the year.

7. Technical Assistance

The refuge routinely provides plans for bird feeders, wood duck and bluebird houses through our visitor center information program. Refuge personnel provided advice on wildlife management studies conducted on the refuge and served as judges at local school science fairs.

Tom Bell continued to serve as a board member for the Scenic Rivers Audubon Club. Clawson served on the property committee for the Cotton Boll Girl Scout Council and as advisor for conservation activities.

F. HABITAT MANAGEMENT

2. Wetlands

Rockhouse and Monopoly marshes continue to be managed on an alternate drawdown basis with Monopoly being drawndown this year. Rockhouse was held up to assure water availability and for reflooding Monopoly if needed. It was not needed. The Monopoly drawdown was slower than previous years indicating a continued silting of the Ditch 5 drainage system. Pools of water remained in low lying areas of Monopoly throughout the summer. Moist soil units were drained on a staggered basis to provide maximum habitat diversity. No pumping was necessary when reflooding due to abundant rainfall during the fall period.

A wet fall created excellent habitat conditions in the hardwood bottomlands of the refuge. However, the ducks were not there. A poor mast crop, dispersal of birds due to wet conditions off the refuge, and lack of birds in the flyway were all contributing factors - the latter being the one of most concern.

Development work associated with wetlands management was as follows:

Pool 8 - A Missouri Department of Conservation contractor constructed levees on the southeast and southwest portion of this wade and shoot waterfowl hunting area - also a twin radial gate structure on Ditch 1 and three 36" lift gate control structures in the southeast, south central, and southwest portions of the pool. Project was 90% completed at the end of the year. A refuge contractor delivered and spread coarse surfacing material on the 2½ mile west levee of this pool.

MS 8&9 - Constructed diaphram on the control culvert in the levee dividing MS 8 east and west units; replaced control culvert between MS 8E and MS 9N, replaced entire control structure between MS 8W and MS 9S.

Moist soil units 8 and 9 were farmed as part of the continuing effort to control woody vegetation. The 1/3 refuge acreage share was planted to Japanese millet with fair seed production. The cooperator lost most of his crop of milo to high water and heavy use by waterfowl.

3. Forests

Seven firewood permits were issued in 1984. Permits are valid for one year and allow a person to salvage down trees up to a maximum of three pickup loads. A nominal fee of $5.00 is charged for each permit. No other timber harvest permits were issued pending development of forest management plan.

Greentree reservoirs had ample water this fall as did all lowland hardwood areas on the refuge. Waterfowl use was down.

No progress was made on development of a forest management plan. However, an area forester position located at Crab Orchard National Wildlife Refuge was filled at the end of the year which should aid in initiation of forest management planning in 1985.

4. Croplands

Crop production in 1984 was fairly good. Refuge permittees farmed a total of 672 acres which included 217 acres of corn and 256 acres of soybeans. Corn averaged 70 bushels/acre and soybeans 25 bushels/acre. The refuge received a third of the corn which was left in the field for wildlife. The permittee received all the soybeans in return for providing fertilizer and seeding wheat following harvest of the beans. However, the wet fall prevented equipment from getting into the fields and no wheat was planted.

Corn is planted primarily for the benefit of the wintering goose flock. Deer also use the corn fields extensively in late winter. Soybeans are the primary cash crop in this area and an important part of the permittee program. Deer make good use of the soybeans during the growing season. Milo receives good waterfowl use, particularly when flooded, and is planted in moist soil units and wetter agricultural fields.

Refuge staff planted wheat in the eighteen acre goose pen field - a low lying heavily used area along a primary access route. No other force account farming is done. Moist soil units are permittee farmed approximately once every three years for the primary purpose of controlling woody vegetation. Moist soil unit acreage was divided 1/3 refuge-2/3 cooperator with the cooperator's share in milo and the refuge's share in Japanese millet. Japanese millet seed production was only fair.

The following table shows crop acres by units for 1984.

Unit	Permittee	Total	Corn	Milo	Beans	Wheat Planted	Wheat Harvested	Japanese Millet
2	W. Payne	100	43		57			
3	R. Walk	49			49			
4	G. Payne	100	50		50			
5	R. Walk	25	25					
6	G. Payne	105	50		55			
8	G. Payne	94	49		45			
10	R. Cookson	40		31				9
12	P. Sifford	18					18	
25-2	Refuge	18				18		
MS 8	R. Cookson	63		42				21
MS 9	R. Cookson	78		52				26
Total		690	217	125	256	18	18	56

5. Grasslands

The refuge has 751 acres of grasslands in seventeen management units. This includes both bottomland and upland pastures. The predominant grassland type is tall fescue with some ladino clover. A few units are predominately redtop and timothy with some clover. An eight acre stand of native warm season grasses consisting of big bluestem, Indian grass, and switchgrass was planted in 1973 for interpretive purposes. The tract was located next to a State highway and subject to frequent fires started by passing motorists. During the year this tract was farmed by a cooperative farmer and thirty acres of fescue in grazing unit 18 were planted to Blackwell switchgrass. Of the three species of warm season grasses this one seems to do the best on the refuge. The new tract, after becoming firmly established, will be incorporated into a rotational grazing system.

Haying and grazing are used as management tools on most of the grassland units to maintain these areas. The units would eventually revert back to woodlands if no management occurred. The grassland units provide excellent browse for geese in support of refuge waterfowl use objectives. They also provide food and cover for a variety of other species, habitat diversity, economic benefits to the local community, and offer refuge visitors excellent viewing areas to see wildlife.

7. Grazing

Grazing was permitted on nine units totaling 557 acres. There were a total of seven permittees, two more than last year. All the permittees that had grazed on the refuge the previous year returned and kept the same units. In addition, three traditional grazing units totaling 149 acres were added back into the grazing program with the selection of two new permittees.

The grazing season ran from April 1 through October 15 on six of the units. It was extended through November 15 on units 11 and 18, to accomodate additional economic use of the refuge, without interfering with the fall auto tours. The grazing rate fee for the season was $5.05 per AUM, compared to the $5.45 rate last year. The grazing rate is calculated each year using the three year average beef price formula described in the Refuge Manual and data furnished by the Missouri Department of Agriculture. The 1984 rate represented a 7% decrease from the previous rate compared to a .8% increase in the yearly beef price. The new rate was well received by all permittees.

Each permittee was required to top dress a portion of his unit with fertilizer or limestone in accordance with soil sample recommendations. The permittee's grazing fees were reduced by one-half to $2.525/AUM to cover the cost of purchasing and applying these soil amendments. Permittees were also required to mow their entire unit at the end of the grazing period to facilitate wildlife use and prevent brush encroachment. AUM rates and refuge receipts from the grazing program are shown in the following table.

Unit	Acres	AUM'S	Receipts	Permittee
GU-7	38	94.5	$ 238.61	Walter Payne
GU-11	45	168.6	425.82	Jerry Koppman
GU-15 & 16	123	308.0	777.70	Claud Walk
GU-17	57	123.7	312.34	Wayne Elledge
GU-18	117	231.1	583.63	E.C. Elledge
GU-19	85	227.3	573.96	G.W. Sifford
GU-21 & 22	92	268.4	677.84	Herman Wilfong
Totals	557	1,421.6	$3,589.90	

Fence maintenance on each grazing unit was the responsibility of the individual permittee. The refuge provided materials. Boundary line fences which bordered on a grazing unit were maintained by the refuge. Very little fence repair was required during the year.

8. Haying

Haying is usually confined to units where grazing is not feasible due to a lack of water or inadequate fencing. However, some of the grazing units with an excess of forage are usually available for haying also. Haying privileges on each individual unit are allocated on a sealed bid basis. Twelve units were put out for bids this year with a total of 280 acres. Four units that were grazed were also hayed. Acreages hayed in the grazing units were less than the total available since the permittees were allowed to selectively cut those units. Permittees were required to completely cut other units to prevent brush encroachment.

Interest in the haying program was very high this year and all available units were bid on. Drought conditions last summer and a hard winter depleted most farmers' hay reserves and they were anxious to replenish stocks. Bids ranged from a low of $3.00 to a high of $10.06. The highest bid field this year only brought $3.00 last year by comparison. Overall the bids averaged $5.15/ton. This reversed the general downward trend in bid prices observed since 1980.

All high bids were accepted and the units hayed beginning July 1. The late date for haying was set to give some protection to nesting birds. Total forage and estimated per acre yields were much better this year than last year. Specific information on the haying program is shown in the following table.

Unit #	Acres	Bid/Ton	Total Tons	Receipts	Permittee
6	5	$ 3.00	8.0	$ 24.00	Russell Fish
8	15	4.00	13.35	53.40	Claud Walk
12	18	10.00	31.65	316.50	Keith Hancock
14*	16	3.00	24.3	72.90	Russell Fish
14*	16	3.00	23.14	69.42	Claud Walk
17**	30	4.01	20.7	83.00	Keith Hancock
18**	100	4.00	82.4	329.60	E.C. Elledge
19**	20	4.01	31.0	124.31	Keith Hancock
20	20	7.62	10.15	77.34	Hobart Scott
21**	5	4.05	8.76	35.48	Ancil Cookson
25-1	8	10.06	23.13	232.69	Hobart Scott
25-3	18	4.01	17.7	70.98	Keith Hancock
25-4	9	4.01	8.9	35.69	Keith Hancock
Totals	280		303.18	$1,525.31	

* Unit divided in half between permittees with same bid
** Unit also grazed

9. Fire Management

There were no prescribed burns on the refuge this year. One wildfire was reported in the woods near the Job Corps Center. The fire burned less than a quarter acre of leaf litter and was extinguished by one person in less than ten minutes. Cause of the fire was unknown, however, it was likely related to a Job Corps enrollee.

The refuge had a net loss of one fire trained individual due to retirement. At the end of the year we had a total of seven employees trained in fire suppression.

10. Pest Control

The main form of pest control on the refuge involves the use of herbicides by cooperative farmers to reduce crop competition. Farmers were only permitted to use those herbicides submitted on a pesticide use proposal and approved by the Regional Office. No insecticides or EPA restricted use herbicides were used on the refuge during the year. No serious pest control problems were noted. The following table shows the chemicals used, acreage involved, and the amount of active ingredients applied on the refuge.

Herbicide	Acres	Pounds AI
Alachlor (Lasso)	473	598
Atrazine	351	372.5
Bentazon (Basagran)	207	97.8

One staff member attended a one-day recertification training program sponsored by the Missouri Department of Agriculture for Public Operators using restricted pesticides. A total of four staff members are qualified to use restricted pesticides, should we ever need them.

Two gypsy moth traps were set out on the refuge in late June in conjunction with a surveillance program by the North-Central Forest Experiment Station. The traps were removed on September 15, and returned. No word was received on the results of the trapping.

12. Wilderness and Special Areas

The registration box set up at the Flatbanks entrance to the Mingo Wilderness Area in 1983 at the request of Associate Professor Alan Everson of the University of Missouri was removed.

Wilderness Area users who voluntarily listed their name, address and phone number were later contacted by Professor Everson to assess (1) observations of real "evidences of man" and (2) perceptions of "evidences of man" that bothered the users. The following table of results was submitted to the refuge:

Number of people interviewed: 26
Number of "evidences" reported: 30
Number of "evidences" bothering users: 7

Evidences	Evidences Bothering
Trash (9)	Trash (6)
Drainage ditches (4)	Worn banks (1)
Fences (3)	
Hunting stands (2)	
Worn banks (2)	
Paths (2)	
Water dammed (2)	
Wooden duck nests (1)	
Wooden eagle nest (1)	
Building material (1)	
55 gallon drum (1)	
Clearing (1)	
Cable (1)	

It seems the main conclusions that can be drawn are (1) littering is a problem everywhere, and (2) several people that identified hunting stands, duck nests, eagle nests, clearings, and possibly some of the other items did not know where they were on the refuge.

In November, the refuge received a draft "Natural Resource Management Guide" from the Farmer's Home Administration. The guide listed the Mingo Wilderness Area as an important land resource and outlined the mechanisms the FmHA will use to avoid impacting such areas through their programs.

G. WILDLIFE

2. Endangered and/or Threatened Species

The eagle hacking program began this past year with a tragedy. Mingo was expecting six to eight eaglets for hacking in 1984. On July 4, a hailstorm struck Bill Voelker's raptor breeding facility in Milstadt, Illinois where twelve nesting bald eagles were being held; eight produced by Voelker in captivity and four naturally hatched birds transferred from Wisconsin. Four eagles were killed and two severely injured. Of the remaining six, one had a twisted wing, two were transferred to Tennessee, and one destined for Missouri was later killed by a predator. Mingo actually received two eaglets; one Wisconsin bird and the other bird hatched at Voelker's facility.

Later, by a stroke of luck, two eagles were found by University of Minnesota Raptor Clinic members, floating in the Mississippi River and Jessie Lake (Minnesota). The birds arrived July 25 via Missouri Department of Conservation aircraft. They were then transferred to Mingo and placed in a second hacking box adjacent to the previously obtained eaglets. A tentative release date was set for August 23.

Bald eagles being unloaded after flight from Minnesota by the Missouri Department of Conservation. DK

August 22, preparation for the release began. Three of the eaglets were radiotagged* and all were banded; Mississippi River bird #62913947, Jessie Lake bird #62913948*, Wisconsin bird #62913949*, breeder's captive hatched bird #62913950*. An attempt was made to replace damaged tail feathers of the Mississippi River and Jessie Lake birds. However, the imping attempt failed. After returning to the hacking box, the bamboo shafts broke as the eaglets moved around within the box. The substitute feathers were then removed.

Banding and imping was done by Paul Price and his assistant, both from Dickerson Park Zoo and Jim D. Wilson of Missouri Department of Conservation. Additional assistance and record keeping was provided by Deborah Jaques and Jim H. Wilson of Missouri Department of Conservation while a representative from KFVS, channel 12, videotaped portions of the event.

On August 23, 9:30 a.m., the door to the second box was opened and the Jessie Lake bird took off without hesitation. For the next several hours the Mississippi River bird tested its wings and inspected the hacking tower area. It left the area sometime after 4:00 p.m. Later that evening the two eaglets initially received were released. The Jessie Lake bird was never sighted after its release. Voelker's captive hatched bird left the area around August 26. The Mississippi River bird was last observed September 4 and the Wisconsin bird September 10.

One of the hacking boxes showing the feeding door. DJ

Twelve bald eagles were noted this year during the mid-winter waterfowl and eagle survey. A pair of adult eagles stayed around the eagle nest tree in Monopoly Lake from mid-February until late April when they left the area. A check of the nest showed no signs of nesting.

There is no documentation of any peregrine falcon sightings during 1984. However, during this writing a possible peregrine observation was made by Mingo staff.

Bird and mammal species on Missouri's State Endangered list that are known to occur on Mingo are: osprey, sharp-shinned hawk, Cooper's hawk, northern harrier, red-shouldered hawk, common barn owl, Swainson's warbler, double-crested cormorant and river otter.

Several other species of fauna and flora listed as endangered or rare by the State are known to occur in the general vicinity of Mingo but no documentation as to presence on Mingo has been made to date.

3. Waterfowl

Peak duck concentrations fluctuate considerably from year to year depending on habitat conditions. Peak goose concentrations are a little more consistent. Below is a summary of the past ten years.

Year	# Ducks*	# Geese*
1983-84	54,500	23,000
1982-83	98,200	30,150
1981-82	85,725 (Feb)	50,000
1980-81	42,000	14,000
1979-80	48,000	19,000
1978-79	90,000	29,975
1977-78	154,200	12,750 (Dec)
1976-77	64,000	25,000
1975-76	108,000	23,600

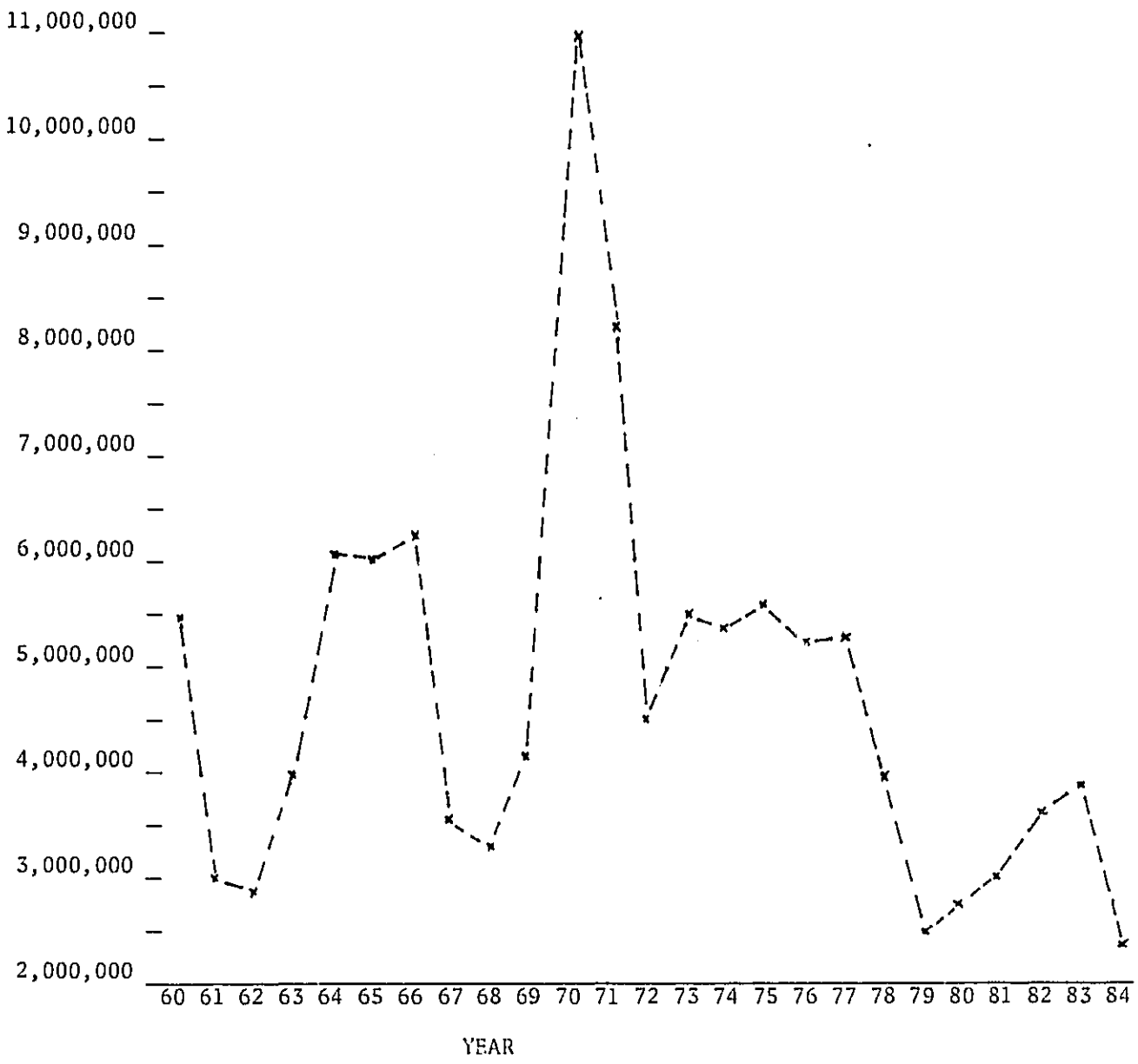
* Duck populations normally peak in November or December unless otherwise noted. Goose populations normally peak in January or February.

During peak concentrations, mallards comprise about 75% of the ducks present on Mingo, however many other species occur in lesser numbers: gadwall, ring-necked duck, pintail, green-winged teal, cinnamon teal, blue-winged teal, American widgeon, northern shoveler, and wood duck. In the fall, gadwall often make up close to 50% of the ducks early in the season with the percentage of mallards increasing later on.

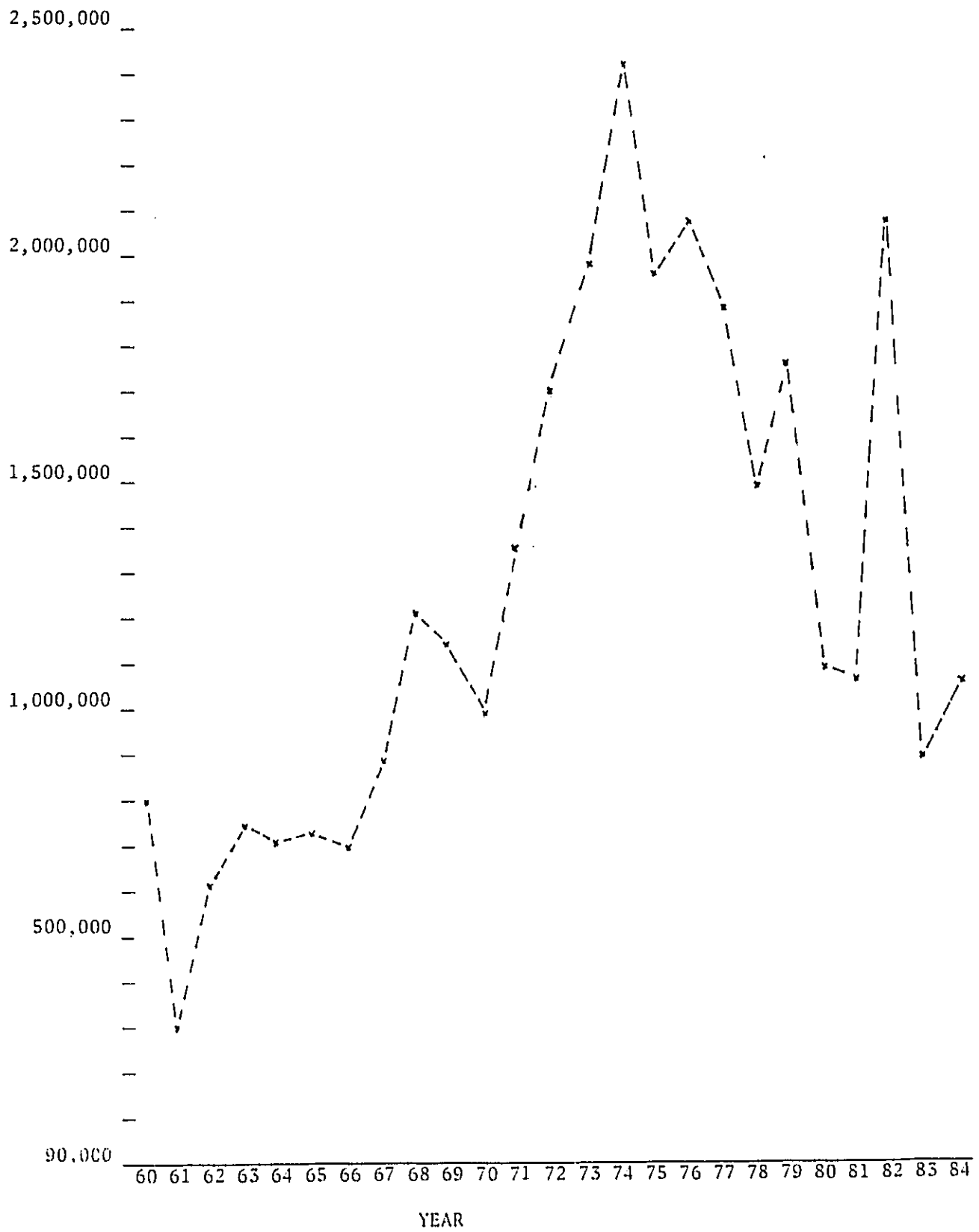
Geese found on Mingo are almost entirely Canada geese with occasional small groups of snows and white-fronted geese observed.

Duck use days have been on the decline since the early seventies but hit an all time low this year; 2,454,550 use days. Geese on the other hand have exhibited a fluctuating but overall increase in use days at Mingo. A summary of the past twenty-four years is given on the following pages.

DUCK USE DAYS
1960-1984



GOOSE USE DAYS
1960-1984



Mingo supplements its wood duck production from natural cavities by additional nesting structures made of sheet metal or wood. These "boxes" are checked for success, repaired and nest material replaced each winter. Success rate for 1984 was 52% and estimated production; 405 wood ducks and 39 hooded mergansers. Estimated natural production would bring the totals to 950 and 59 respectively. Results for the past eight years are presented below.

Year	# Successful Nests	# Unsuccessful Attempts	# Not Used	Total # Boxes
1984	52 (51%)	15 (15%)	34 (34%)	101
1983	47 (47%)	17 (17%)	36 (36%)	100
1982	42 (42%)	12 (12%)	47 (46%)	101
1981	42 (44%)	7 (7%)	46 (49%)	95
1980	56 (58%)	13 (14%)	27 (28%)	96
1979	41 (40%)	20 (20%)	40 (40%)	101
1978	39 (48%)	18 (22%)	24 (30%)	80
1977	31 (30%)	20 (19%)	53 (51%)	104

Canada geese occurring on the refuge are primarily winter migrants, however Mingo has a few nesting Canada geese each year. Of the four existing goose tubs, one on Red Mill Pond was successful in producing goslings in 1984.

Geese using fescue field near refuge maintenance shop. TB

Since 1982, Mingo National Wildlife Refuge has cooperated with Missouri Department of Conservation in their efforts to restore the migratory tradition of trumpeter swans in the Mississippi Flyway. An experimental reintroduction program was initiated with family groups from LaCreek National Wildlife Refuge being released each summer-fall. This year no swans were released due to a miscalculation in timing of the molt which precluded trapping and no swans were available for transfer. At present, two adult swans from the 1982 release and possibly one adult from the 1983 release are living and appear to have made Mingo their home. Current plans call for transfer and release of non-breeding birds in 1985 rather than family groups. Breeding success within the LaCreek population was low in 1984 and the removal of additional breeding birds at this time would put undesirable pressure on the swan population.

4. Marsh and Water Birds

Mingo is home to a variety of marsh and water bird species. Although not commonly observed due to its secretive behavior, the sora rail occurs in great numbers. Others occurring in abundance are Virginia rail and pied-billed grebe. Several species of heron can be observed on Mingo; great blue, little blue, green-backed, black-crowned and yellow-crowned. Of these the green-backed heron is the most abundant. It was once believed that all of these heron species nested on or near the refuge but at present no known rookeries exist.

5. Shorebirds, Gulls, Terns, and Allied Species

Numerous species of shorebirds, gulls, and terns have been known to make use of habitat within Mingo. The best area to observe these birds is within the moist soil units adjacent to Red Mill Drive. Allocation of additional time and improved census techniques would provide greater insight into species present, abundance and habitat use.

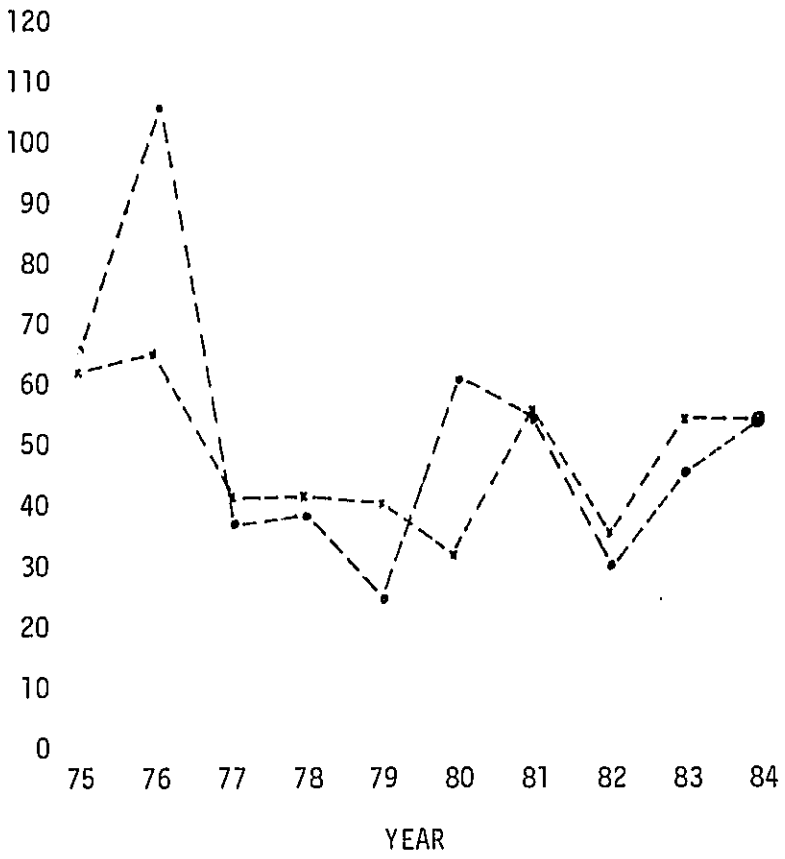
6. Raptors

Mingo's vast acreage provides the expanses of habitat required by many raptors for their continued survival. Several species commonly observed include: red-tailed hawk*, red-shouldered hawk*, marsh hawk, American kestrel*, bald eagle, turkey vulture*, and barred-owl*. Others known to frequent the refuge but observed less often include: great-horned owl*, screech owl*, black vulture*, osprey*, rough-legged hawk, broad-winged hawk, Cooper's hawk*, sharp-shinned hawk, peregrine falcon, saw-whet owl, and short-eared owl (Those species marked with an asterisk are known to nest on Mingo).

A nest of one of Missouri's less common birds, the Mississippi kite, was found in September in the Fox Pond area. The nest was located by Missouri Department of Conservation personnel Debbie Jaques. The Missouri Department of Conservation is currently attempting to acquire baseline information on breeding birds and nest sites. Prior to the finding at Mingo, a single nest in the Cape Girardeau area was the only known nest in Missouri. Apparently the birds nest in habitat associated with woods and fields or in Mingo's instance, adjacent to the moist soil units. There is a good indication that at least two additional nests exist near MSU 2 and 7.

7. Other Migratory Birds

Mourning dove call-count surveys were run again in 1984 with basically zero to moderate disturbance noted. Results of the past ten years' surveys are presented below.



x: Route #0050, Butler and Stoddard Counties
o: Route #0072, New Madrid County
* Route #0072 was incomplete in 1983 due to flooding

December 29 marked 1984's Christmas Bird Count at Mingo with a total of eighty species observed. Among the unusual sightings were vesper sparrow, fox sparrow, field sparrow, cedar waxwing, ruby-crowned kinglet, brown creeper, and red-breasted nuthatch. Unusual sightings during the count week included; double-crested cormorant and ring-billed gull.

8. Game Mammals

Several of Missouri's game mammals occur on Mingo Refuge: whitetail deer, fox squirrel, gray squirrel, cottontail rabbit, swamp rabbit, bobcat, raccoon, mink, gray fox, red fox, coyote, and beaver. Of these, the whitetail deer is the most conspicuous. Exact size of the herd is unknown as no formal censusing is done but based on hunt data and general observations, the herd appears to be in good condition. Dispersal of the deer is dependent to a large degree on flooding and freezing in the bottomlands. Under harsh conditions the deer are concentrated on higher areas around the periphery of the refuge.

10. Other Resident Wildlife

Turkeys abound at Mingo and can be easily observed during the fall and winter months. Mingo's turkey population is substantial enough to assist the Missouri Department of Conservation in their efforts to re-establish river otters and ruffed grouse in Missouri. Populations of both species were depleted approximately eighty years ago due to over exploitation in the instance of the river otter and through loss of grouse habitat from excessive grazing and burning. Mingo's turkeys are shipped to other states in trade for river otters and ruffed grouse. In the past, turkeys have been an item of barter for a variety of items including native prairie plant seed and striped bass.

Large and diverse populations of herps occur on Mingo including three species of venomous snakes; the eastern cottonmouth, timber rattlesnake, and southern copperhead. At least 62 species are known to reside on the refuge. In spring many herp species increase activity and can be easily observed.

11. Fisheries Resources

Although Mingo Refuge was established primarily as a refuge for migratory waterfowl, a large fishery resource exists on the refuge and fishing is a major form of public use. Of the water systems on the refuge, Gum Stump Pool has been found to contain the highest quality of game fish communities. This is most likely attributable to the fact that access to the pool is via a 2.5 mile walk which keeps the number of visitors low. Management specifically for fish exists on two ponds; May Pond and Fox Pond. The emphasis in both cases is on the production of a good bluegill and catfish fishery.

May Pond is approximately 21 acres and was constructed in 1976 by Job Corps. The pond has been stocked with and managed for bluegill, bass, channel catfish and redear sunfish. Additional species of unknown origin include: warmouth, green sunfish, brown and black bullheads, golden shiner and mosquito fish. Recent sampling results indicated 12 inch largemouth bass as abundant and those exceeding 12 inches as present. There is presently and has been since the pond's opening in 1980, a 12 inch minimum size limit on largemouth bass. This regulation was set 1) to compensate for the heavy bass fishing pressure the pond receives, hopefully allowing the bass population to increase and

stabilize with an acceptable distribution of age classes and 2) to maintain the bluegill population at a level where reproduction is low and growth rate high. Sufficient reproduction for normal recruitment of channel catfish exists with length of fish ranging 13-17 inches. Five hundred 8-10 inch channel catfish were stocked this year. Catfish fishing is permitted by pole and line only. The closing date for fishing on May Pond was extended to November 30, in 1984 in order to increase fishing opportunities. September 30 was the closing date in previous years.

Fox Pond was constructed in 1973 by Job Corps with fishing as a major objective. In the past, the 12 acre pond has been stocked with and managed for bluegill, largemouth bass, and channel catfish. Turbidity due largely to shoreline and watershed erosion has kept submergent aquatic vegetation to a minimum. The bass population at present is small and has not (as a predator species) successfully maintained the bluegill population at a desirable level. Present management includes regulations for protecting all bass, in the hope of increasing the bass population, hence reducing the bluegill population and stimulating a high bluegill growth rate.

Future plans call for:

1) continued monitoring (electroshocking)
2) the taking of no bass
3) no channel catfish stocking
4) reduction of turbidity by eliminating watershed and shoreline erosion

Mingo is currently involved in an eagle restoration program with the Missouri Department of Conservation. To reduce disturbance in the hacking tower area, Fox Pond is closed from the time the eaglets are placed in the tower until they have left the area.

12. Wildlife Propagation and Stocking

Trumpeter Swan Restoration: See Section 3 - Wildlife
Eagle Hacking Program: See Section 2 - Wildlife
Fish: See Section 11 - Wildlife

14. Scientific Collections

A total of 37 mallards were collected by Dan Combs in connection with his PhD study; "Winter Ecology of Drake Mallards."

The Missouri Department of Conservation trapped a total of 132 turkeys on the refuge for use in their wildlife exchange programs.

15. Animal Control

Mingo does not have a formal animal control program at present. The refuge does have a trapping plan and assists farmers with crop depredation problems. The trapping plan involves the removal of beaver only. This provide the public with an opportunity for trapping and also assists with management of a problem species. Unfortunately the only trapping permittee was cited January 9, 1984 with several violations of State and Federal laws resulting in the loss of his permit. Fifty beaver had been taken in 1984 prior to the loss of the trapper's permit. Since beaver pelt prices are low at present and the effort considerable, the interest in trapping beaver is minimal. The probability of acquiring a new trapper is slim. However, an effort will be made to find a trapper to assist in population control of this species.

16. Marking and Banding

The appearance of large concentrations of geese on the refuge tends to coincide with the opening of hunt season. This makes pre-season banding difficult and efforts to date have been unsuccessful. This year banding efforts were carried into the season and 303 geese* were banded and neck collared. Although not entirely pre-season catch, it makes a first for reaching our quota of 300. Last year's efforts resulted in a total of 71 geese banded (October, November, December 1983; January, February 1984).

* Number includes data for 1984-85: October, November, December 1984; January, February 1985

Refuge personnel are presently assisting Dr. Donald Rusch and staff of the Wisconsin Cooperative Wildlife Research Station with their study on movements and survival of Canada geese by providing observation information. As of December 31, 1984, 387 total (280 different) neck collar observations had been made. As of this writing, observations total 580.

By the end of the banding season, the refuge was blanketed in white and nearly all was frozen. The ducks had left for better habitat - leaving us with a zero banding total for mallards.

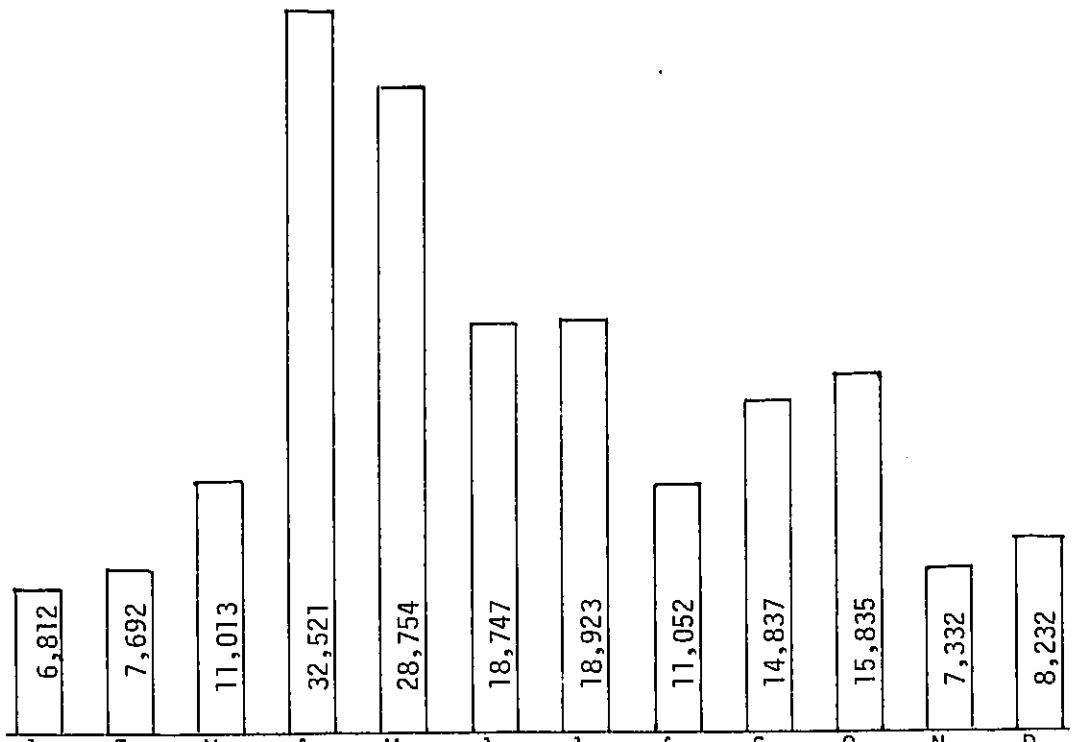
H. PUBLIC USE

1. General

The primary visitation period occurred in the spring during April and May (61,275 visits). A bit of a variation from past years use was the increase in visitation during June and July to 21% of the total (37,670 visits). The fall months of October and November accounted for 17% of visitation (30,672 visits). Overall visitation for the year, 181,750 visits, was somewhat less than Mingo's ten year average of 184,397.

Ten Year Summary:

1984	181,750	1979	175,786
1983	187,763	1978	225,140
1982	208,936	1977	133,338
1981	231,337	1976	153,294
1980	182,089	1975	164,540



Visitation by Month for 1984

2. Outdoor Classrooms - Students

Mingo National Wildlife Refuge provides an excellent opportunity for teachers and students alike to explore various environmental topics. The refuge has a limited supply of materials and equipment to be used by environmental education groups and sample lesson plans are also available for teachers. Two large rooms in the basement of the visitor center can accommodate a fairly large class and provide the environment necessary for lectures, presentations, and discussions. A large shelter adjacent to the visitor center parking lot is also available for outdoor discussion and lunches. The shelter houses stone picnic tables and a barbeque.

During 1984, 2,043 students and teachers spent over 10,556 hours on environmental education activities on Mingo. This is an encouraging increase over last year's 1,810 visits.

3. Outdoor Classrooms - Teachers

This year Mingo National Wildlife Refuge hosted an environmental education workshop specifically designed for teachers. The workshop has been an annual event at Mingo and is sponsored by the Missouri Department of Conservation, Southeast Missouri State University and Mingo National Wildlife Refuge. Twenty-five teachers attended the five day workshop and gave it excellent reviews.

A second half day workshop involving forty-seven teachers from Southwest Missouri State University was led by instructor Wendell Jeffries. The trip to Mingo was part of the course work for Wendell Jeffries' conservation education course.

Teachers are encouraged to utilize the environmental resources and technical assistance available to them here at Mingo and to bring their students out for first hand exposure to the basics of ecology and environmental issues.

4. Interpretive Foot Trails

Two interpretive foot trails exist on Mingo for visitor use; the Boardwalk Nature Trail and the Red Mill Observation Blind Trail. Both take the visitor along a wooden path through a part of the refuge especially chosen for its representative qualities. Each trail has a self-guiding interpretive brochure explaining the ecological importance of the various stops on the trail.

The Boardwalk Nature Trail is approximately one mile long and leads to an observation tower overlooking Rockhouse Marsh. The trail can be reached from the Boardwalk parking lot or from the Bluff Trail starting at the visitor center. The emphasis of the Boardwalk Nature Trail is on the ecology of lowland hardwood ecosyste[illegible].

Specific stops along the .2 mile Red Mill Trail depict different types of wood duck nesting structures. The trail brochure discusses nesting requirements for the wood duck. An observation blind at the end of the trail provides an opportunity for birders and photographers to observe wildlife at a much closer range than could be achieved otherwise.

5. Interpretive Tour Routes

Despite excessive rainfall and numerous tornado warnings, visitors evidently had enough of indoor activities and came out in force to see what Mingo had to offer. A total of 3,819 visits to the auto tour were recorded this year with the greatest concentration during the fall season; 2,100 visits. These figures are down from 1983 when 4,791 visits (3,141 fall) were recorded - a reflection of the rainfall and poor weekend weather. Numerous comments were received on the abundance of wildlife visible along the tour route.

6. Interpretive Exhibits/Demonstrations

The Mingo visitor center houses several different types of interpretive displays which assist the visitor in understanding various aspects of the refuge such as wildlife management, swamp ecology, archaeology, and the history behind Mingo National Wildlife Refuge. The center received 12,823 visitors this year.

One hundred ninety-two visitors viewed the films "America's Wetlands" and "Water, We Can't Live Without It" during National Wildlife Week, March 17-25.

The refuge again participated in National Hunting and Fishing Day in September. In cooperation with the Corps of Engineers and Missouri Department of Conservation, booths and displays were set up at Lake Wappapello and Cape Girardeau's West Park Mall. It was estimated that at least 500 people were contacted through these efforts.

The local community had nine entries in the poster contest titled, "How Sportsmen's Duck Stamp Dollars Benefit Wildlife", sponsored by the National Hunting and Fishing Day committee of the National Shooting Sports Foundation. One senior and three junior entries were forwarded to the National Shooting Sports Foundation headquarters for judging in a national contest. However, no prizes were won this year by the entries.

7. Other Interpretive Programs

Several overlooks exist along the main Bluff Road and the auto tour route. Two of these have self interpretive panels explaining the ecological importance and history of the area. The popularity of these areas brings the total visits to interpretive exhibits to 31,637 for 1984.

8. Hunting

A. Squirrel

Although the season was extended this year, the popularity of squirrel hunting appears to be on the decline. As shown below, both the number of hunters and the number of squirrels taken on Mingo have decreased over the past four years.

Year	# Hunters	# Squirrels Taken
1984	211	311
1983	452	604
1982	630	875
1981	782	1,004
1980	660	461

This year was one of poor mast production and a severely cold winter suggesting a reduction in the squirrel population, and hence, less hunting opportunity.

B. Deer

Mingo's archery deer season opened October 1 and closed December 31 with fifty deer reported taken. All records are from sign out stations on Mingo and rely on the "honor system".

Total Deer Harvested 1977-1984

Year	# Deer Harvested	# Hunter Visits
1984	50 (35 bucks, 15 does)	5,064
1983	98 (66 bucks, 32 does)	5,873
1982	62 (41 bucks, 21 does)	5,513
1981	75 (35 bucks, 40 does)	6,655
1980	70 (35 bucks, 35 does)	6,432
1979	39 (23 bucks, 16 does)	5,184
1978	59 (30 bucks, 29 does)	5,635
1977	51 (29 bucks, 22 does)	5,635

1984 Deer Harvested By Month

Month	# Deer Harvested
October	16
November	24
December	10

C. Turkey

Hunters participated in Mingo's archery turkey season for the sixth year this last fall and results were consistent with past years.

Year	# Turkeys Harvested
1984	3
1983	2
1982	2
1981	3
1980	6
1979	6

April 23 through May 6 marked the refuge's third annual spring firearms turkey season. A total of twenty-three turkeys were taken with 387 hunters participating. Although turkey hunting is considered the most dangerous form of hunting in Missouri, no accidents or serious problems occurred.

Year	# Turkeys Harvested	# Hunters
1984	23	387
1983	21	451
1982	25	337

D. Waterfowl

Excessive rainfall provided ample waterfowl habitat this year causing birds to disperse off the refuge, reducing hunting opportunity. Ninety-three hunters took a total of twenty-two waterfowl (17 ducks, 5 geese) during the split season; November 1 through December 2 and December 15 through January 1 (goose season extending through January 20).

Harvest Summary from the Wade and Shoot Area

Year	# Ducks	# Geese	# Hunters	# Birds/Hunter
1984	17	5	93	.23
1983	305	6	259	1.20
1982	315	0	378	.83
1981	847	1	572	1.48
1980	4	0	21	.19
1979	191	6	199	.98
1978	36	11	61	.77

9. Fishing

Of all the activities a visitor can experience at Mingo, fishing is second in popularity only to wildlife observation. An estimated 169,719 hours were logged and 47,596 visits attributed to fishing at Mingo this year. Many people are "regulars", coming out daily to fish primarily for catfish or bluegill and if they are lucky, a bass or two.

10. Trapping

The trapping program is discussed under Section 15 - Wildlife.

11. Wildlife Observation

Whether it be to birdwatch, look for one of Mingo's many herp species, get a glimpse of deer or other mammals or just observe Mingo's unique ecology, wildlife observation is the single most popular activity on the refuge. An estimated 65,250 visits and 91,778 activity hours attributable to wildlife observation were recorded for 1984.

12. Other Wildlife Oriented Recreation

Photography by both amateurs and professionals is enjoyed year-round at Mingo. Although the observation blind on Red Mill trail exists, occasionally a special use permit is granted to construct a blind or gain access to a closed portion of the refuge by an individual who hopes to catch a rare moment on film.

When the morels arrive and the blackberries and nuts are ready, you can find a few hardy individuals out collecting their favorite wild edibles.

14. Picnicking

Several picnic tables are available for visitor use, most of which are located adjacent to popular fishing areas. Construction of the new picnic shelter, adjacent to the visitor center parking lot, was recently completed and offers several tables and barbeque grills in addition to shelter from adverse weather. School and environmental education groups find the shelter more than adequate for discussion and lunch time gatherings.

17. Law Enforcement

Excellent cooperation and coordination of state law enforcement agents with federal officers resulted in fifty-four violation notices for infractions of state and federal regulations on the refuge. Two arrest warrants were issued which sufficed to cause the individuals to pay their fines without being served, and one violation resulted in the forfeiture of a .22 caliber rifle.

Evidence of poaching on Mingo National Wildlife Refuge has existed for sometime but catching individuals in the act has been difficult. This year however, Refuge Manager Gerry Clawson and Missouri Department of Conservation agent Dennis Steward were more fortunate and issued two violation notices for possession and transport of illegal deer.

Early in the year federal agent Larry Keck and Eric Sipco issued violation notices to the refuge trapper and a second individual for violations of the Lacey Act, running untagged traps, not carrying a permit as required, and taking, possessing, and removing non-target furbearers during closed season.

The following table shows the number, type of violation, and individual fine paid per violation for cases made on the refuge. All cases this year were prosecuted successfully.

Violation	No. of Violations	Fine Paid
Unauthorized possession of loaded firearm*	1	$150
Unauthorized possession of loaded firearm	12	35
Failure to remove personal property (deer stand)	2	25
Using boat without required flotation device	5	25
Unauthorized camping	1	25
Removal of vegetation without authorization	1	50
Fishing with unlabeled trotline	1	50
Fishing without valid state license	2	50
Unauthorized trespass with vehicle	11	25
Unauthorized trespass on horseback	8	25
Hunting without valid state license	1	50
Unauthorized taking of wildlife (deer)	1	50
Failure to sign out after hunting	2	50
Trapping/transporting protected species (Lacey Act)	1	350
Trapping/transporting protected species (Lacey Act)	1	100
Possession and transport of illegal deer**	1	50 plus 33.50 court cost
Take and possess illegal deer**	1	50 plus 33.50 court cost
Hunting raccoon during closed season**	2	50 plus 29.00 court cost

* FOC increased to $150 on arrest warrant
** Prosecuted in State Court

Assistant Manager Sipco assisted law enforcement personnel on a security detail relating to "Operation Falcon" at Great Falls, Montana, in October.

18. Cooperating Associations

Mingo experienced its third successful year of sales in cooperation with the Midwest Interpretive Association. A total of 3,671 items were sold for $4,257.20 in 1984, almost double the number of items sold last year. Sixty-two percent of the sales occurred during the months of May, June, October, and November as would be expected considering Southeast Missouri's most favorable weather conditions exist at these times.

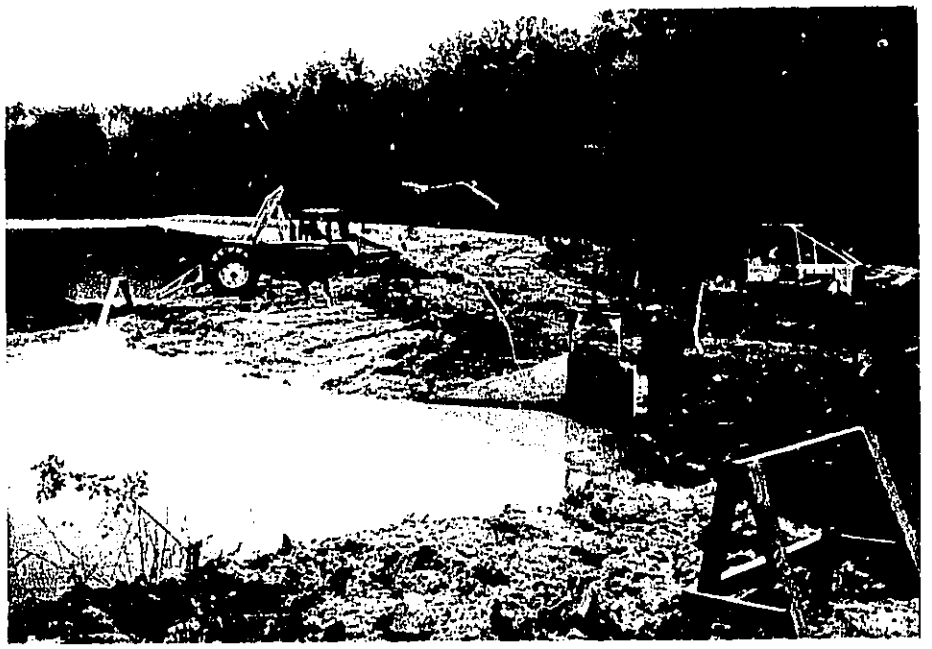
Summary of Sales to Date

Year	# of Items	Gross Receipts	# of Items Available
1984	3,671	$4,257.20	133
1983	1,902	3,807.76	141
1982	729	2,118.93	57

I. EQUIPMENT AND FACILITIES

1. New Construction

Missouri Department of Conservation in accordance with a cooperative waterfowl hunting agreement began installing four new water control structures in the vicinity of Pool 8 to improve water control of the pool. The southeast and southwest corners of Pool 8 and the southeast corner of MSU 3 will each contain 36" lift gates. A twin radial gate structure will be in place at Ditch 1 in the southeast corner of Pool 8. Construction of the structures began May 22 but due to heavy and frequent rainfall this year, work progressed slowly. Construction should be completed with the first dry spell in 1985.



Missouri Department of Conservation contractor installing water control structure near the southeast corner of Pool 8. GC

A 15' diameter, 800 bushel Butler grain bin was erected on the refuge May 11 by the Buttry Construction Company. The $2,680 bin was funded under the ARMM's program.

A native stone fireplace was constructed and concrete columns veneered with stone on the picnic shelter near the visitor center parking lot. Work was completed by the Job Corps brick laying crew.

Fiscal year 1984 funds have been obligated and an order placed with the Iron Mountain Forge Company for a 60'x6' laminated wood pedestrian footbridge. The new bridge will replace the present badly deteriorated bridge on the Boardwalk Nature Trail. Delivery is contingent upon favorable weather conditions.

2. Rehabilitation

Lemon's Gravel Company delivered and tailgate spread 3,375 tons of gravel at a total cost of $23,042.81. Major areas resurfaced included the following:

-Pool 6 banding site to Sandblow Ridge
-Entire west levee of Pool 8 from southwest corner of Kookemboo Bridge
-Ditch 4 road from the control culvert to north end of refuge

Moist soil unit rehabilitation included the following:

-replaced stoplog structure and culvert between MSU 8W and 9S
-replaced culvert in stoplog structure between MSU 8E and 9N
-constructed diaphragm on control culvert between MSU 8E and 8W
-repaired leaking structure on MSU 6 and added ten foot extension to culvert

YCC crews replaced ¼ mile of refuge boundary fence on the southwest corner of the refuge between Wappapello Gate and Battleshell Lake and 1/8 mile of fence along the maintenance building parallel with Highway 51.

Replaced 30" culvert on auto tour route at southeast corner of Sifford pasture (GU 19).

The Bluff, Boardwalk and Hartz Pond trails along with Monopoly and Bluff road overlooks were reworked this year. Vegetation was trimmed, wood chips and weather damaged portions of the wooden walkways were replaced.

All bridge rails in need were restored with a new coat of paint by YCC crews.

3. Major Maintenance

The visitor center exterior received a face lift in June when Job Corps restained the building. Job Corps also replaced the roof on the 8-stall equipment building. Work on the roof began in September and was completed in October.

Job Corps carpentry crew reroofing refuge 8-stall garage.
GC

Entrance signs on Z Highway near Rabbit Ridge and Idlewild were restained and repaired.

4. Equipment Utilization and Replacement

January 18, the refuge received a Rockwell Model 7V metal cutting bandsaw.

A hoist (Rotary Mark VI, 8,000 lb. frame lift) was installed in the refuge shop by refuge staff and Job Corps. The new hoist will make work on vehicles with low ground clearance much easier.

A new Case tractor Model 2090 arrived on March 14 replacing a small International tractor inherited from the YACC program. This is the first tractor Mingo Refuge has had with a cab.

7. Energy Conservation

Electrical use increased 16% and fuel consumption was reduced 21.4% in fiscal year 1984. Electrical use is a reflection of the hot summer and use of the visitor center air conditioning system. Fuel consumption is related to reduced pumping in the moist soil units (wet fall) and lack of brush control work in Rockhouse (Rockhouse remained flooded all summer).

Electrical and Fuel Usage

Electrical 1984: 75,175 KWH
Electrical 1983: 65,083 KWH

1984 Fuel Allocation:	6,800 gallons	1983 Fuel Allocation:	6,800 gallons
1983 Fuel Use:	5,602 gallons	1983 Fuel Use:	7,128 gallons

J. OTHER ITEMS

1. Cooperative Programs

Cooperative programs with the Missouri Department of Conservation included waterfowl hunting, turkey trapping, eagle hacking, and trumpeter swan restoration. All are covered in other sections of this report.

A cooperative agreement with the University of Missouri-Gaylord Lab for use of the old YACC office (former refuge office building) became effective on November 2. The University will use the facility for graduate student office space, storage of reference materials such as herbarium specimens and study skins, and other related research and educational activities. Cooperative research studies are discussed under Section D - Planning (Research and Investigations).

3. Items of Interest

Refuge revenue sharing checks to the counties were approximately 15% less than the preceding year. Amounts received were as follows:

Stoddard County - $29,687
Wayne County - $23,231

This refuge served as host for the annual work plan meeting for refuges (Division 2) August 27-30.

Attendees at the August annual work plan meeting. JM

Assistant Manager Eric Sipco continued as a member of the regional refuge law enforcement task force committee and represented the region at the law enforcement coordination meeting at FLETC June 25-29. Eric was also the Division 2 coordinator for the law enforcement refresher training held at Springfield, Illinois April 30 through May 4.

Training received during the year was as follows:

40 Hours Law Enforcement Refresher Training:

- Clawson, Sipco, 4/30-5/4, Springfield, IL
- Bell, 3/26-30, Minneapolis, MN

Basic Fire Training, S-110, S-130, S-190:

- Bell, 1/9-11, FWS instructor, Calhoun Refuge, Grafton, IL
- Kimbrell, 3/19-21, Forest Service instructor, Van Buren, MO

Administrative Training:

- Administrative Procedures - McClendon, 2/13-17, Minneapolis, MN
- Pay-pers Training - McClendon, 4/11-13, Minneapolis, MN
- Small Purchases - McClendon, by correspondence, Acquisition and Assistance, Inc., completed 7/84 for warrant authority

Supervisory Training:

- Leadership and Supervisory Institute (OPM) - Bell, 4/9-12, St. Louis, MO
- Understanding and Managing Human Behavior (OPM) - Sipco, 1/18-20, St. Louis, MO

Basic Refuge Manager Training Academy:

- Kimbrell, 4/16-5/11, Blair, NE

Other:

- Recertification of Pesticide Applicator License - Sipco, 2/29, Cape Girardeau, MO

- A-76 Training - Sipco, 4/1-6, Minneapolis, MN

- Canada Goose Banding Workshops - Siler and Shelton, 9/11-12, Wapanocca NWR, Turrell, AR

- Waterfowl and Wetland Management Seminar (sponsored by University of Missouri) - Clawson, 9/24-27, Hannibal, MO

- American Red Cross Standard First Aid and Personal Safety Training- Foster, Kimbrell, and Siler, 12/6 and 12/11, Wappapello, MO

Sunset over Mingo. TB

4. Credits

Sections A, B, C, D, F 5-13 - Sipco
Sections E, F 1-4, J, K - Clawson
Sections G, H, I - Kimbrell
Typing - Foster

K. FEEDBACK

Interest in the Job Corps program by Associate Director Stiegletz as evidenced by his visit to Mingo in October was refreshing. Job Corps has been an unwanted stepchild within the Service in recent years. It is a political program, constantly struggling for survival, and demands for their work services from the local community far exceed their ability to produce. This new interest has made them more responsive to the needs of the refuge and aided us in getting some things done.

Increase in project leader spending authority to $5,000 was long overdue. It was a helpful move.

Reduction in paperwork category:

- eliminate the Quarterly Work Units report form submitted to the Denver Service Center - too general to be of value.

- eliminate the requirement that two copies of form 3-2103 (purchase order) be sent to CGS, every time a purchase order is issued or goods or services are received. It should only be necessary on purchases of capitalized property.